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ABSTRACT

The organization of behavioral episodes can be described at two levels: the physical level of movement and sound and the phenomenal level of action. Social perception theory and research generally operates at a phenomenal level of behavioral description. Movement and sound traditionally have been considered inadequately structured to provide much specific information to social perception. As a result of neglecting the relationship between the two descriptive levels of behavioral stimulation, social perception theory and research, until recently, have neglected the fundamental issue of behavior perception. In contrast, other research literatures have focused on structure in movement and sound and have identified invariant patterns that specify a variety of human characteristics and activities and that relate to the perception of causality and purposive behavior in certain interaction episodes. Here, the various findings are integrated into a discussion of the relationship between phenomenal units and structure describable at a physical level. An expanded conception of dynamic stimulation is proposed in which the contribution of interpretation and inference is balanced against the information available in movement and sound. (Author)

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Reconsidering the Information Potential of Movement and Sound in Social Perception[1]

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The organization of behavioral episodes can be described at two levels: the physical level of movement and sound and the phenomenal level of action. Social perception theory and research generally operates at a phenomenal level of behavioral description. Movement and sound traditionally have been considered inadequately structured to provide much specific information to social perception. As a result of neglecting the relationship between the two descriptive levels of behavioral stimulation, social perception theory and research, until recently, have neglected the fundamental issue of behavior perception. In contrast, other research literatures have focused on structure in movement and sound and have identified invariant patterns that specify a variety of human characteristics and activities and that relate to the perception of causality and purposive behavior in certain interaction episodes. Here, the various findings are integrated into a discussion of the relationship between phenomenal units and structure describable at a physical level. An expanded conception of dynamic stimulation is proposed in which the contribution of interpretation and inference is balanced against the information available in movement and sound.

In previous work, we and a handful of other investigators have argued for an ecological perspective in social perception (Baron, 1980; Knowles & Smith, 1982; McArthur, 1980; Shotter, 1981; Shotter & Newson, 1980; Smith, Knowles, & Ginsburg, 1983). We use the term ecological to refer to the perspective taken in event perception and in Gibson's (1950) early perceptual psychophysics as well as his more recent ecological approach (Gibson, 1966, 1979). Two aspects of this approach are relevant to this paper. First, this perspective is more phenomenological in orientation than more traditional approaches to perception. An observer's immediate impressions of aspects of the environment are in terms of percepts rather than sensations (Gibson, 1963). Sensory input, on the other hand, is not ruled out, a fact related to the second aspect. The ecological perspective is characterized by the emphasis it places on environmental stimulation as a source of information for perception. Under the influence of environmental constraints, stimulation is structured in a fashion specific to resulting percepts. Unlike more traditional approaches which focus on processes within the head of the observer, the resulting account of perception involves an interactive process whereby an information seeking perceiver actively searches available stimulation for patterns which specify their environmental sources to perception.

In applying this approach to social perception, it seems reasonable to begin with the primary source of information about others: their behavior. Surprisingly, the fundamental issue of behavior perception has been ignored for the most part in the body of literature on social perception. Consider two

levels at which the organization of behavioral episodes can be described: the physical level of movement and sound and the phenomenal level of action. Investigation of movement and sound are rare, being dismissed under the traditional assumption that the physical stimulation obtained from the observation of behavior is inadequately structured to provide much specific information to social perception. This assumption has led a number of investigators (e.g., Jones & Gerard, 1967; Tagiuri, 1969) to suggest that social perception is only metaphorically perceptual.

Social perception theory and research generally operates at a phenomenal level of behavior description. Even at this level, however, the perception of action is assumed rather than investigated. The traditional approach focuses initial interest upon the linguistic transformation, or categorization, of action input (Smith, Knowles, & Ginsburg, 1983). Discussions of the observation of behavior in social perception usually involve personal components of action (such as intention, exertion, ability, assumed desirability, knowledge, etc.) or environmental components of action (such as task difficulty, opportunity, coersion, etc.) or their interrelations (such as task difficulty combining with ability to determine whether the act can be performed, or intention and exertion determining whether the act will be performed; e.g., Heider, 1958). Such tactics address how an observer can <u>account</u> for the selection or appearance of an action but neglect how it is that we <u>perceive</u> action.

The ordinary operation of social perception theory and research ultimately requires that greater attention be directed at behavior perception, in particular, the perception of action. Is, for example, the uncritically accepted assumption of an action input in social perception warranted? If we do immediately perceive behavior in terms of actions rather than movement and sound, how do we account for such percepts?

The Perception of Ongoing Behavior

From traditional perspectives on perception, action perception would appear to raise problems involving the relationship between the two levels of description. One such problem involves the question raised about immediate impressions of behavior. Actions, as percepts, are not considered directly available to observers. An observer's immediate impressions are thought to be sensory in nature and involve stimulation described at a physical level. Such evidence as exists contrasts with this assumption. The contrast is seen most clearly in Newtson's work on the visual perception of ongoing behavior and in speech perception.

By having subjects press an event recorder button to demarcate meaningful actions in a videotaped behavior sequence, Newtson (1973) found a greater than chance agreement on action unit boundaries and an indication that individuals who used smaller units were breaking up into smaller pieces the action units of those who "parsed" larger ones. Characteristic of lower level, initial perceptual units (cf., Savin & Bever, 1970), film frame deletions of 1/6 to 1/2 sec. within action unit boundaries resist detection by observers (Newtson & Engquist, 1976). Further, like many other perceptual tasks, behavior unitization is disrupted by arousal, but not by cognitive interference tasks (Newtson, 1976).

Likewise, preliminary research in speech perception suggests that the perceiver's impression of verbal behavior is one of various size units of speech rather than sound. The rapid rate of production in speech and the limited temporal resolving power of the ear rule out a simple alphabetical code (Kirman, 1973; Rosenfeld, 1981; Savin & Bever, 1970). Indeed, the identification of individual sounds, or phonemes, would appear to depend upon the identification of the larger linguistic sequence of which they are a part (Savin & Bever, 1970). Kirman (1973, p. 52) concludes that "if phonemes are perceived at all, they are

more likely to be a product of a secondary analysis of a more directly perceived larger unit." Such larger units could be features of language such as syllables and words or they may be features of communication such as phrases and messages.

Research on the perception of action units in ongoing behavior is far from complete. For example, the research by Newtson and his associates has generally focused on simple, repetitive behaviors within an individual, as opposed to a complex social, context. Jensen and Schroder (1982) have extended this line of research to dyadic coaction but only report the number of marks and not agreement between observers on the location of action unit boundaries. Von Cranach (1981) has had some success in studying behavior segmentation in mother-infant interaction and male-female interaction is currently under study in our lab. With these reservations, the findings above suggest that when people observe behavior, they ordinarily perceive actions of various sizes rather than movement and sound.

Accounting for Action Percepts

If we can accept this conclusion for the moment, it becomes necessary to provide some account for such percepts. The necessary information for action perception must come from somewhere and a logical starting point for investigation is to search the physical stimulation available to observers for correlates of action percepts. An observer's immediate impression of behavior as actions does not rule out consideration of movement and sound for their information potential. To the extent that actions are reflected in structural properties of movement and sound, such properties can be said to provide an information base for the perception of actions.

Here a second set of problems arise from the apparent breakdown in the relationship between the two descriptive levels. First, actions are discrete

while movement and sound are relatively fluid. Second, order is not thought to be a property of the stimulation impinging upon the sensory receptors of a perceiver according to traditional perspectives on perception. If the physical stimulation obtained from movement and sound is considered a disorganized flux, it seems unlikely that such input is structured sufficiently to specify action percepts. The order necessary to account for perception is usually considered a property of the perceiver imposed upon incoming stimulation by constructive processes.

Acknowledging this position, we should also consider the possibility that the contrasts at the two levels may be more apparent than real. Whereas such approaches operate more from a set of assumptions, the information potential of stimulation is an empirical issue. Recent evidence suggests that movement and sound as a source of stimulation is not a disorganized flux. Rather it appears highly structured in a form relevant to action perception.

For example, the speech perception and event perception literatures focus on patterns which emerge in the stimulation available to the perceiver. As noted above, much of the speech perception literature is concerned with the larger context, or configuration of sounds, as a potential source of information for the perception of speech. Although the event perception literature was originally concerned with the relatively simple motions of inanimate objects, interest has increased recently for the more complex movements of animate objects. Researchers have found support for a number of high order, relational variables which emerge in movement as invariant patterns that specify a variety of human characteristics and activities (cf., Johansson, vonHofsten, & Jansson, 1980). Examples include walking, running, climbing, dancing in couples (Hoenkamp, 1978; Johansson, 1973, 1976), the identification of friends and of gender from gait patterns (Cutting, 1978; Cutting & Kozlowski, 1977; Cutting, Profitt, and

Kozlowski, 1978), and the identification of human faces and facial expressions of emotion (Bassili, 1978). Interestingly enough, research in event perception directed at action perception is beginning to investigate the traditional, complex phenomena of social perception such as Runeson and Frykholm's forthcoming publication on the kinematic specification of expectation and deceptive intention in the movement patterns of a behaving individual.

Although our understanding of the information potential of structure in movement and sound stimulation is far from complete, the research literature mentioned above illustrates the feasibility of isolating patterns at a physical level of description which specify action content. What then of the discrete nature of action percepts? Using Newtson's work as an example, the lack of impact of cognitive interference tasks on behavior unitization suggests that if there is a cognitive factor in operation, it is not likely to be a high order, interpretive process. Also, the significant level of agreement between subjects on the location of action unit boundaries suggests either that they were using very similar subjective criteria or that they were responding to unit defining information in the observed behavior.

The evidence from Newtson, Engquist, and Bois (1977) supports the latter interpretation. They found that pairs of successive boundaries, or breakpoints, were characterized by a greater amount of change in the position of the behaving individual than is true of pairs of nonbreakpoints separated by equivalent periods of time. This relation held for units varying in size across what they call gross, natural (no unit size instructions), and fine, indicating that there is a basis in movement structure for large actions as well as for the smaller ones which compose them. This finding supports the notion of multilevel structure in behavior proposed in other areas of investigation such as linguistics and nonverbal communication. Analysis of bodily feature change

from breakpoint to breakpoint indicated that the different features monitored in the different videotape sequences were those most relevant to the specific overall action definition of the episode.

They suggest that the perception of action is an ongoing, interactive process whereby an active perceiver is constantly exploring environmental stimulation for certain kinds of action defining information. Although they compromise their position by proposing anticipatory schema to account for attentional processes, this conclusion is interesting. Compared with more traditional conceptions in which a computer-like perceiver receives and processes input and outputs information, it implies a sharply contrasting conception of both the role of the perceiver and the information potential of stimulation. The proposed interactive process can be applied to earlier research relating these seemingly lower level perceptual units to the information obtained from the observation of a behavior sequence. Intelligibility, order, recognition memory, and description accuracy are greatest for boundary points (Newtson & Engquist, 1976). Also, action unit size affects conclusions drawn from an observed sequence and subjects tend to mark smaller, more informative units after the appearance of an enigmatic behavior (Newtson, 1973). These findings suggest that the detection of finer detail in action is used as an exploratory strategy to isolate information.

With respect to the perception of discrete units of verbal communication, work in paralinguistic behavior provides interesting implications for phrase and message level units. In addition to influencing messages conveyed by lexically identical items, intonation patterns can be used as specific markers for identifying message chunks in discourse (Crystal, 1975; Halliday, 1976; Jaffe & Feldstein, 1970; Kreckel, 1980). The research on tone units complements Newtson's work and "illustrates the existence of directly perceivable

structural markers of meaning in ongoing action, the existence of which can be identified independently of the interpretive activities of observers" (Ginsburg, 1980, p. 312). Likewise, research on the regulation and management of prolonged discourse through conversation synchrony (cf., Condon, 1977, 1979; Condon & Ogston, 1967; Condon & Sanders, 1974a, 1974b; Kendon, 1972; Rosenfeld, 1978) has led Rosenfeld (1981) to suggest that individuals synchronize their conversations through the exchange of paralinguistic and kinesic signals at junctions of a phrase-related unit called the phonetic clause. The boundaries of this unit occur about once every dozen words and are specified in paralinguistic behavior by "closing features of primary stress, which is usually located in a key informational word at or near the end of the unit followed by a subsequent slowing of speech, and in its most effective forms, ending with a rising or, better yet, a falling pitch."

An Ecological Perspective

Taken as a whole, these disconnected literatures illustrate the value of investigating the structure detectable in behavioral stimulation. The discrimination of discrete actions of various durations seems to be given immediately to observers. Such impressions appear to be specified at a physical level by coherent, temporally extensive patterns of movement and sound stimulation that have boundaries delineated by some form of change. This change may reflect the ending of a preceding pattern and the initiation of a following pattern, or it may reflect the appearance of terminal marking patterns.

Such an analysis need not imply that the observer, or the investigator for that matter, is restricted to a particular chain of events of specified duration in any one observation period. The evidence above suggests that actions vary in their inclusiveness as well as their duration. They are not only located sequentially with respect to prior and following actions, they are also located

within larger, more inclusive actions allowing various levels of action perception with each specified in patterns of obtained stimulation but with no one level viewed as "natural" or correct. It should be noted that this is not the same notion of hierarchical organization as used by Collett and Lamb (in press) in their work on behavior segmentation. They advance a strict notion in which "objective" reality is singular in its structure. From an ecological perspective, the particular structure that arises in obtained stimulation is a function of the dynamic interplay between the sensitivities of the active, information seeking perceiver and potential information from environmental sources such that there may be multiple hierarchies, or heterarchies, possible for any single occurrence. Discussion of multiple hierarchies is provided by Bakeman and Ginsburg (in press), Ginsburg (1981), and Kendon (1979).

These implications suggest the plausibility of a more direct approach to action perception. To the extent that behavior appears in patterns which are recurring and familiar, they enable the identification of action content rather than the inevitable need to interpret or infer what is going on. Interpretation seems more appropriate when ordinary structure is not apparent or when an individual is given ambiguous verbal materials, as is often the case in social perception research (Knowles & Smith, 1982; Smith, Knowles, & Ginsburg, 1983). Under such conditions, the individual must engage in thought rather than perception.

Although the evidence is far from complete, it seems reasonable to suspect that the content of action units is not completely novel and enigmatic. As with other phenomena, there are physical constraints placed on behavior as a source of stimulation. Individuals do not fly, survive leaps from high places, and so forth due to the interaction of their construction and the nature of the environment. The layout of the environment necessitates that if an individual

is to move from one area to another, he must take paths which avoid objects. The availability of objects, their shape, weight, and features dictate whether or not they can be picked up, moved, or used by the individual. The impact of physical constraints in structuring behavioral stimulation is the foundation of the action perception work in event perception.

While there are many other physical constraints placed upon behavior, many of the interesting constraints placed upon behavior in immediate situations are conventional rather than physical. The adherence of behavior to physical constraints is describable in terms of laws and results in patterns of behavior which are invariant. The adherence of behavior to social constraints is describable in terms of rules and results in patterns of behavior which are regular or routine. Both invariant and routine patterns may be considered here. The distinction is made in recognition of the fact that environmental constraints may be mandatory and inviolable or they may be conventional and violable. It does not imply that conventional patterns of behavior be eliminated from consideration for their potential to convey information for action perception (cf., Gibson, 1963, p. 11). The information potential of such patterns however may require a somewhat expanded approach, one which considers configurations of pattern as well as patterns in isolation.

An Expanded Conception of Dynamic Stimulation

The inclusion of actions of various durations and levels of inclusiveness broadens the information base available to perception. Certain patterns of stimulation have perceptual meaning in isolation. Such patterns have, for general purposes, invariant outcomes. For example, symmetrical expansions of retinal patterns of stimulation specify collision and result in avoidance behavior in individuals as early as one to two weeks of age (Ball & Tronick, 1971; Bower, Broughton, & Moore, 1970). Other patterns, many obtained from sources

in the social environment, have certain outcomes or resulting patterns which are routinely associated with their appearance. The perceptual meaning of such patterns often requires that consideration be given to their appearance within the larger context of a series of patterns, the configuration of which is taken as a whole.

Research by Michotte (1963) and Bassili (1976) on the perception of causality and purposive behavior helps to illustrate the somewhat complex operation of configural notions of perceptual stimulation. Although their research used the relatively simple motion of objects, their simulation of social interaction found that particular configurations of pattern and change in the motion of objects, when taken as a whole, provide information for the experience of a meaningful event in the perceptual sense that certain configurations specified particular immediate impressions of causality and purposive action and variations in those configurations did not give rise to those impressions. Likewise, the perceptual meaning of a particular motion pattern appears to be a function of the progressively larger context of preceding and following patterns. For example, the motion of B in the direction of A is seen as chasing if it is briefly followed by a change in the direction of A's motion and then a similar change in the direction of B's motion that converges on the new path taken by A. Otherwise, the motion of B in the direction of A is ambiguous. Again, there is no one unit which is necessarily "natural." For example, the motion of A which ends when it makes contact with B is an unambiguous event which a perceiver might label, when asked, as collision or "running into." The motion of A which ends upon contacting B and is followed with a motion of B in the same direction is an event we call launching, pushing, or shoving. In this case the event of colliding is embedded within the event of launching.

The chasing example above points out an important feature of action

perception analyzed from configural information. This point involves the "direction" of information with respect to time in the perception of large, extended events such as episodes of behavior. It is undeniable that configurations unfold in a unidirectional, forward fashion in time. At the time of the appearance of a particular movement pattern, it is relatively simple to see how the configuration of patterns which precedes it and of which it is a part is available to provide information for the perception of that pattern as an action. The unidirectional unfolding of action, however, does not mean that perceptual meaning cannot be bidirectional. The meaning of the initial motion of B toward A as an action in the example was affected in large part by the configuration of patterns which followed. Within the present format, backward directed information can serve the function of modifying, or revising, action perception of a particular pattern as greater configuration becomes apparent. Rather than implying a cognitive process of reinterpretation, this is essentially an expansion of the coherent unit notion.

A Brief Note on Temporal Factors in Perception

The discussion of direction in information flow brings up a temporal factor in perception which has been implicit throughout this paper and some mention of it should be made before closing. Since perceptual stimulation is generally restricted to the "present," consideration must be given to the time frames admissible in a discussion of perception which features structure in stimulation which unfolds over time. In doing so, it is important to recognize that the selection of any chunk of time to call the present is an arbitrary decision with very real consequences for theory in perception.

For example, metric time is not variable and the applicability of msec., sec., min., hours, and so forth as such is minimal in the ordinary impressions of the organism. We can hardly speak of movement, much less patterns of

movement, in perception under conceptions which would freeze the present into an abstract "point" in time or expand it to, say 60 msec. to reflect a visual "perceptual moment" (cf., Efron, 1967). Further, such conceptions place the outcomes of an action, or its implications, in the future and action becomes ambiguous and removed from the realm of perception. This leaves an observer who must construct and test moment-to-moment hypotheses about action implications. Newtson, Engquist, and Bois's introduction of anticipatory schemata to help structure structured stimulation for perception is a concession to this way of thinking about time.

Perhaps the most advantageous conception of the time frames of perception has been proposed by Gibson (1979) and by Shotter (1980). They propose a description in terms of duration -- from a beginning to an ending. Although it too is not without problems, it is variable, it reflects the ordinary impressions of time in the experience of the organism, and it allows the inclusion of surrounding changes in patterns of stimulation.

Final Remarks

In summary, we have attempted to pull together evidence on behavior perception from a variety of literatures and give it some coherence within the framework of the ecological perspective on perception. We have emphasized the potential richness of the information available in movement and sound stimulation to offset the narrow focus on internal processing in social perception theory. Eventually,we will have to attend to the inputs into social perception processes if we ever hope to have an understanding that is more than metaphorically perceptual.

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